DocuMate 150

Service Manual

Table of Contents

1. INTRODUCTION

This manual is intended to be used by the maintenance engineers. It describes areas to be maintained, the detailed installation, the disassembly of Auto Document Feeder, and the component replacement procedures as well as the main trouble shooting guides.

Please take your time to read this manual thoroughly to obtain comprehensive knowledge about the DocuMate 150 before serving the unit.

1.1 General notes for servicing

(1) Before trying to disassemble the DocuMate 150, make sure the power supply cord of the DocuMate 150 is disconnected from the power outlet. Under any circumstance, do not remove or install the connectors on the DocuMate 150 with the power supply turned ON.

(2) Use caution not to drop small parts or screws inside the unit when disassembling and reassembling. If left inside, they might cause the malfunction of the unit.

(3) Do not pull the connector cable when disconnecting it. Hold the connector.

(4) When carrying the scanning head unit, put it in an anti-static bag.

(5) Keep the document table glass surface always clean. If contaminated, use a dry clean cloth for cleaning.

(6) Use caution not to injure your fingers or hands when disassembling or reassembling the unit.

1.2 General Description

The DocuMate 150 which features small footprint and fast scan rate is the perfect companion at your desktop. The build-in automatic document feeder allows 50 sheets of documents to be scanned continuously at one time and achieves fast scan rate of 25 pages per minute.

2. SPECIFICATION

2.1 Basic Specifications

Product Name:	DocuMate 150
Type:	Sheetfed simplex scanner
Optical Resolution:	600 dpi
Color Depth:	48-bit Color (input) 24-bit Color (output) single pass color (R, G, B)
Image Type:	B&W Gray Color
ADF Scan Speed: **(NONE Channel at 200dpi B&W A4 size)**	25 pages per minute
Scan Area:	ADF: minimum: 3.5" x 2" (88 x 50 mm) ADF: maximum: 8.5"x 14" (215 x 355 mm)
Paper Size:	ADF Max.: 8.5" x 14" (Legal) ADF min.: 3.5" x 2"
Paper Thickness:	16 – 28 lbs/0.002" ~ 0.006"
Paper Input (ADF):	up to 50 sheets
Physical Dimension: **HxWxD**	156 mm x 308 mm x 145 mm
Weight:	2.2 kgs
Interface:	USB 2.0
Power Source:	100~240Vac, 50/60 Hz (input) 24V, 2.0A (output)
Power Consumption:	≤ 30 Watts (operation) < 6 Watts (standby)
Lamp Life	15,000 hours
ADF Pad Life	50,000 scans(at Xerox 4024 DP 20 lb. Paper)
Temperature	10°C to 35°C
Humidity	10-85%RH
Storage Temperature	-40°C→65°C

3. UNPACKING, INSTALLATION, AND TRANSPORTATION

3.1 Precautions of Installation

Pay attention to the following matters before unpacking and installation.

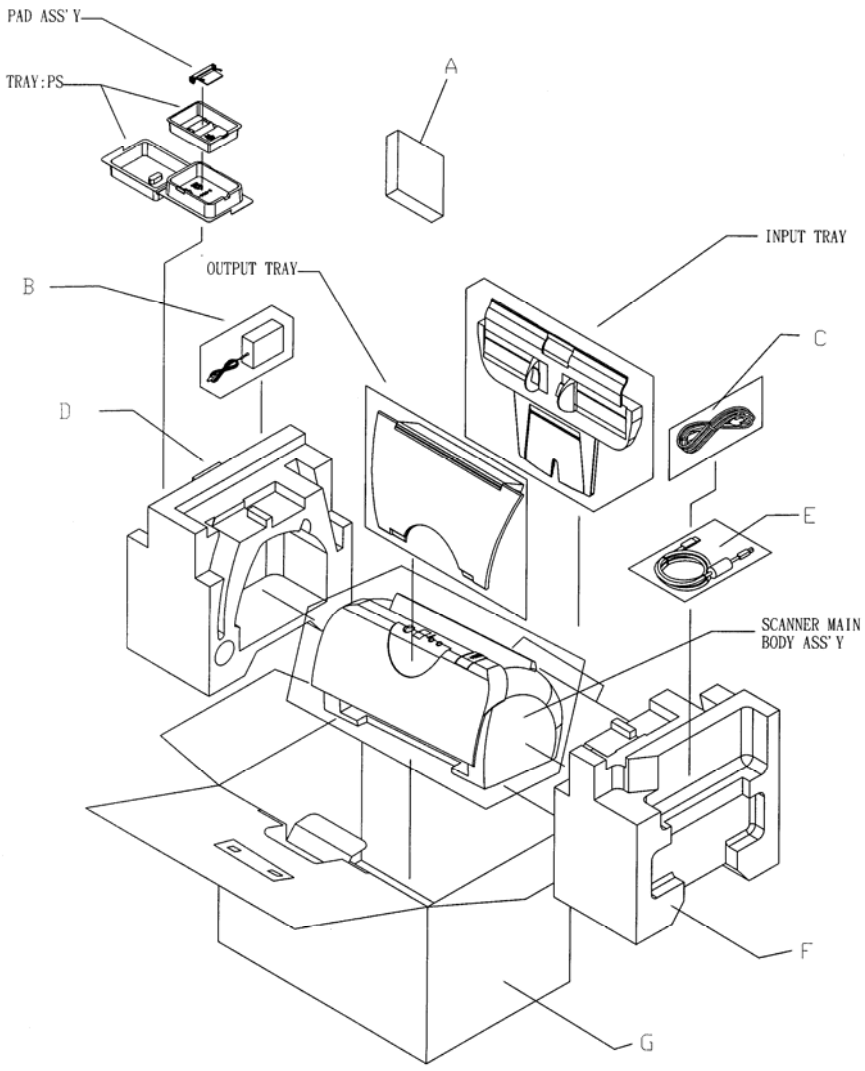
- Do not install in a place where vibration may occur.
- Keep the DocuMate 150 out of direct sunlight. Do not install near a heat source.
- Do not place the DocuMate 150 around materials which shut off the circulation of air.
- Do not install in a humid or dusty place.
- Use care not to scratch the glass surface of the DocuMate 150 or the document holding pad with a clip or staple.
- Do not use the wall socket with connecting devices which may generate noise, for example, air-conditioner, etc.
- Use a suitable AC power source.
- Place the DocuMate 150 on a level surface.

3.2 Unpacking Procedure

Unpack the DocuMate 150 according to the following procedure.

- Remove the packing material.
- Remove the DocuMate 150 from the shipping container.
- Remove the DocuMate 150 from the PVC bag.
- Check the items by referring to Figure 3.1.
- For any missing items, please contact your nearest dealer or distributor.

Note: Keep all the packing material in case you may need to return the DocuMate 150.



A. Adapter
B. AC Power Cordially
C. EPS Foam
D. USB Cable
E. EPS Foam
F. Carton

Figure 3.1 Package Contents

4. THEORY OF OPERATION

4.1 Introduction

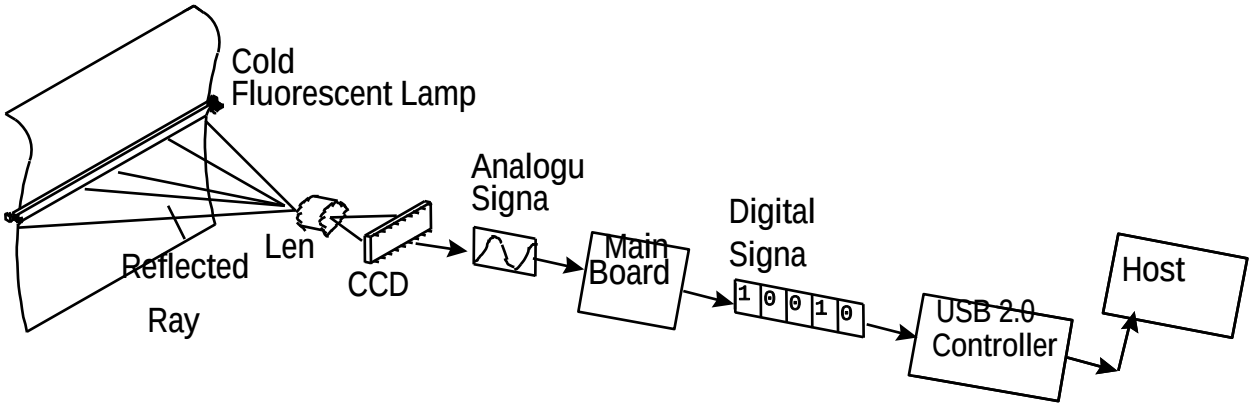


Figure 4.1 Theory of Operation

The reflected rays of your original as shown in the above Figure 4.1 pass through the lens and create an image on the CCD (Charged Coupled Device). Then, according to the different light intensity perceived by the CCD, the CCD will transfer these data into a series of analog signals to the main board, where the signals are turned into digital signals. The digital signals flows to the USB 2.0 Controller to transfer to a host computer.

4.2 Main control unit

4.2.1 System diagram

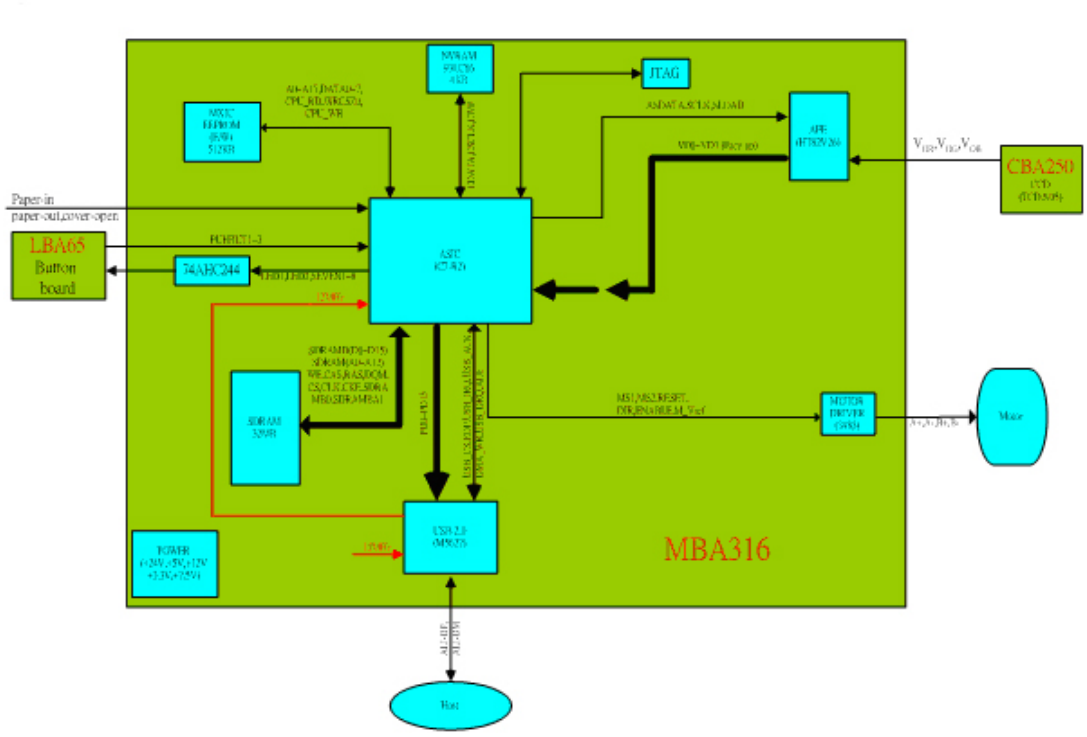


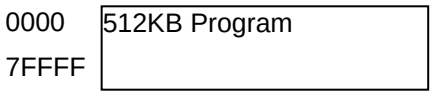
Figure 4.2 DocuMate 150 System block diagram

4.2.2 Main control circuit

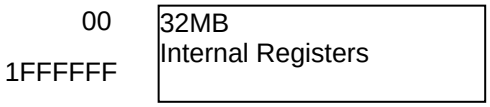
This scanner is controlled by the tensilica 32 bits CPU. The CPU is configured with a 512-KB external ROM program area, a 32-MB external SDRAM work area, 2 timer / counters, 3 external interrupts.

Address Maps:

- ROM program area:



- External SDRAM working area:



4.2.3 Video circuit:

The video circuit of this DocuMate 150 includes: 1. CCD driving circuit, 2. CCD signal processing circuit.

1. CCD Driving Circuit

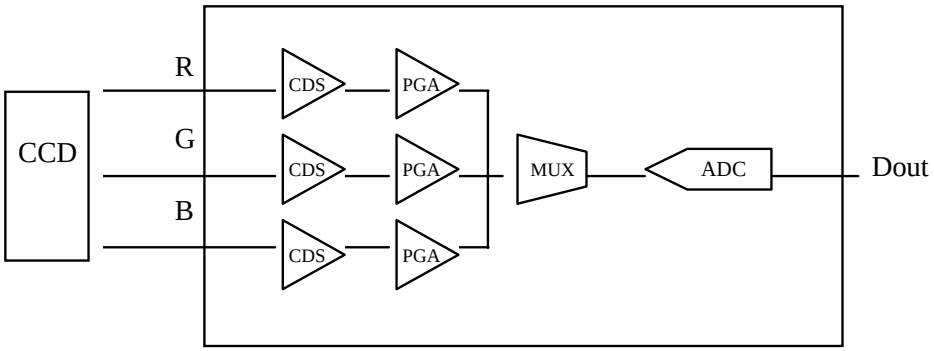
The CCD driving circuit is used to generate correct signals to the CCD, so that the CCD may generate the correct image data.

Signals for CCD:

Pin Assignment for CCD cable

Pin No.	Name	Function
1	DG	Digital Ground
2	12VDC	CCD Power Supply
3	DG	Digital Ground
4	VOB	CCD Blue Channel Output Signal
5	DG	Digital Ground
6	VOG	CCD Green Channel Output Signal
7	DG	Digital Ground
8	VOR	CCD Red Channel Output Signal
9	DG	Digital Ground
10	SW 1	CCD Switch
11	RS	CCD Reset Gate
12	CP	Clamp Gate
13	PHI 2	CCD Clock Phase
14	PHI 1	CCD Clock Phase
15	SH	CCD RGB Channel Shift Gate
16	5VDC	CCD Power Supply
17	DG	Digital Ground
18	5 VDC	CCD Power Supply

2. CCD signal processing circuit



CCD Signal Processor

The CCD signal processor includes all the necessary circuitry to perform three-channel conditioning and sampling. The signal chain consists of three-channel correlated double sampling (CDS) and programmable gain adjustment of the CCD output (PGA) is a 8 bit analog to digital connector (ADC) quantizes the analog signal.

4.2.4 LED and Push Button Module Circuit

The circuit for the LED and Push Button modules shows the function of the entire scanner including the Error LED (Red), the Ready LED (Blue) and the Push Button.

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Pin assignment of LED module

Pin No.	Name	Function
1	Button 3	Scan
2	Seven 8	Seven segment display
3	Seven 7	Seven segment display
4	Seven 6	Seven segment display
5	Seven 5	Seven segment display
6	Seven 4	Seven segment display
7	Seven 3	Seven segment display
8	Seven 2	Seven segment display
9	Seven 1	Seven segment display
10	Button 2	Cancel
11	LED R	Seven segment display
12	LED B	Ready status indicator
13	Button 1	Function
14	DG	Digital Ground
15	5 VDC	Power Supply

4.2.5 Sensor input

Photo_Sensor

The sensor input includes paper in/out sensor.

Paper In/Out sensor
The paper position is detected by photo sensor. The photo transistor transmission to the photo sensor receiver circuit is shown below.

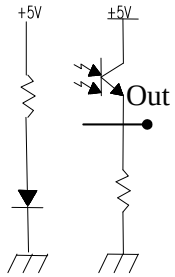
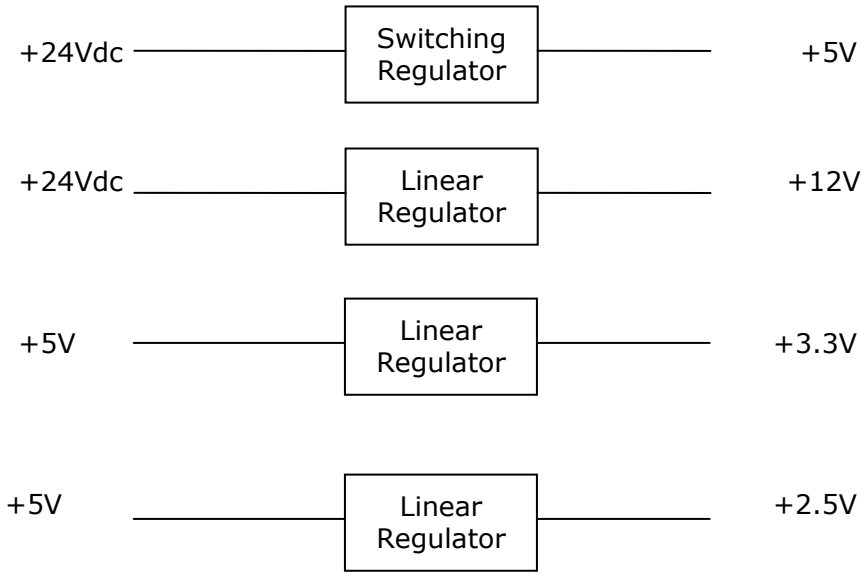


Figure 4.3 Paper in/out sensor

The paper in/out sensor is detected when the paper passes between the LED and the photo transistor.

4.2.6 Sub power supply circuit

The sub power supply circuit is provided for the internal analog circuit. Input is 24V and output is Vcc and +5Va. The circuit configuration is shown below:



The sub power supply is used for: A/D, and logic circuits.

4.2.7 Power supply

In this system, there is only one type of power supply. Please see Table 4.1 for details.

Table 4.1 Power Adapter

Type / Characteristic	Wall-mount
Input voltage range	100-240V
Input current (at the rated input/output)	800mA type or less
Input frequency	50-60Hz
Max. in-rush current(@full load, cold start)	70A
Output voltage	+24Vdc
Min. load current	0.0A
Max. load current	1A
Total power (at full load)	24W

5. PROBLEM SOLVING

This chapter supplies two paths for dealing with operational problems. The first relies on the DocuMate150's internal diagnostics. The second uses troubleshooting flowcharts and tables to isolate the problem. In many cases, the internal diagnostics will help you to locate the source of the problem quickly. Use these diagnostics first. If the diagnostics do not locate the source of the problem, refer to Section 5.2 **Troubleshooting**.

5.1 Diagnostics

The DocuMate150 has internal diagnostics to help you determine the cause of operational problems. Some of the diagnostics function with the scanner online, while others are part of a separate offline diagnostics feature.

5.1.1 Online diagnostics

Determine operational problems by observing the display panel Error, Ready ,and Check LEDs. With the scanner online and operating normally, the Ready LED is on and the Error LED is off. Any other Error LED indicates a problem, as shown in the following table.

Ready LED	Green LED On
Check LED	Green LED Blinking
Error LED Indication	RED LED Blinking (Group Error)

Table 5.1 Online diagnostics

If the ADF cover is open, close it. For the group errors, see the flowcharts later in this section.

5.1.2 Offline diagnostics

To run the offline diagnostics, and turn the power back on. When you first turn the scanner back on, the READY light will blink, indicating that the diagnostics are in progress. Observe the front panel Error LED closely. In a short time, the Error LED indicates the results of the offline diagnostics as explained in the table below.

Ready LED (Green)	Error LED (RED)	Error Indication
ON (No blinking)	OFF	OK (Ready)
OFF	1	DRAM failure
OFF	2	MVRAM failure
OFF	3	AFE failure
OFF	4	USB failure
OFF	5	Internal test
OFF	6	Light check failure
OFF	7	Command failure
OFF	8	Paper jam
OFF	9	Internal test
OFF	0	Internal test
OFF	10	Cover open error

Table 5.2 Offline diagnostics results

For SRAM & DRAM error, refer to Main Control PCBA Replacement in Chapter 4. For the Group 2 error, see the flowchart in the following section.

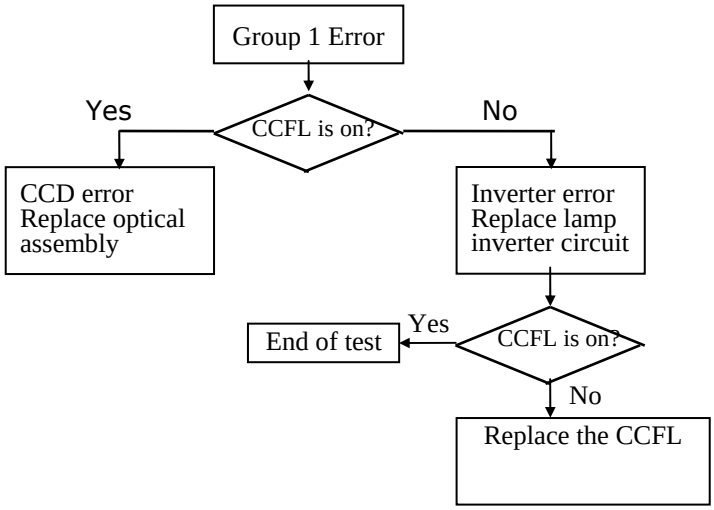
To return the scanner to online operation, turn off the scanner, turn the scanner back on.

5.1.3 Diagnostic flowcharts

Use the flowcharts that follow to determine the exact problem when either the online or offline diagnostics indicate a group error. Refer to Chapter 4 for parts replacement.

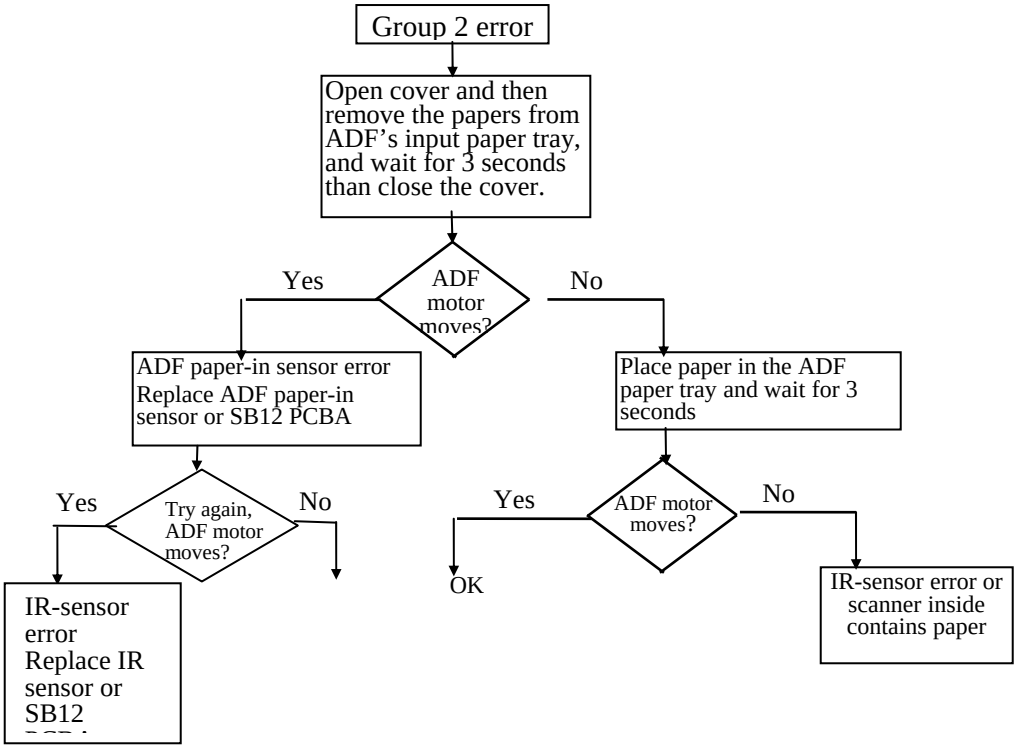
5.1.3.1 Group 1 error flowchart (CCFL assembly)

This flowchart applies when the Error LED shows number 6.



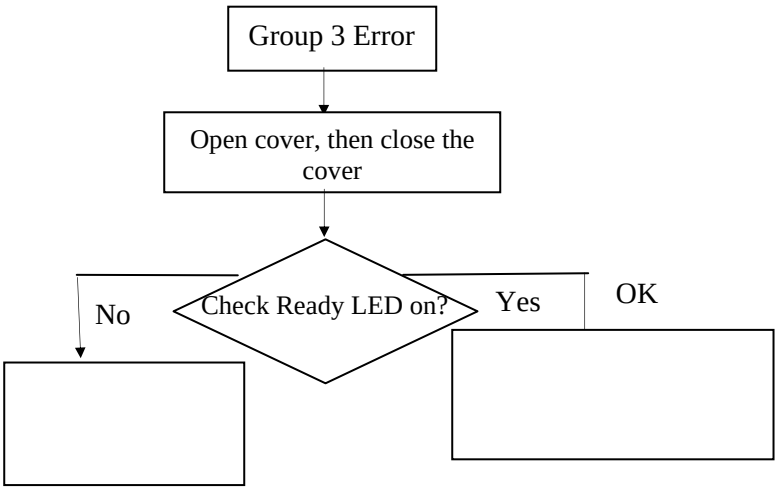
5.1.3.2 Group 2 error flowchart (paper in ADF paper tray)

This flowchart applies when the Ready LED is off and Error LED shows number 8 with the scanner online, and there is paper in the ADF paper tray.



5.1.3.3 Group 3 error flowchart (no paper in ADF paper tray)

This flowchart applies when the Ready LED is off and Error LED shows number 10 with the scanner online, and there is no paper in the ADF paper tray.



5.2 Troubleshooting

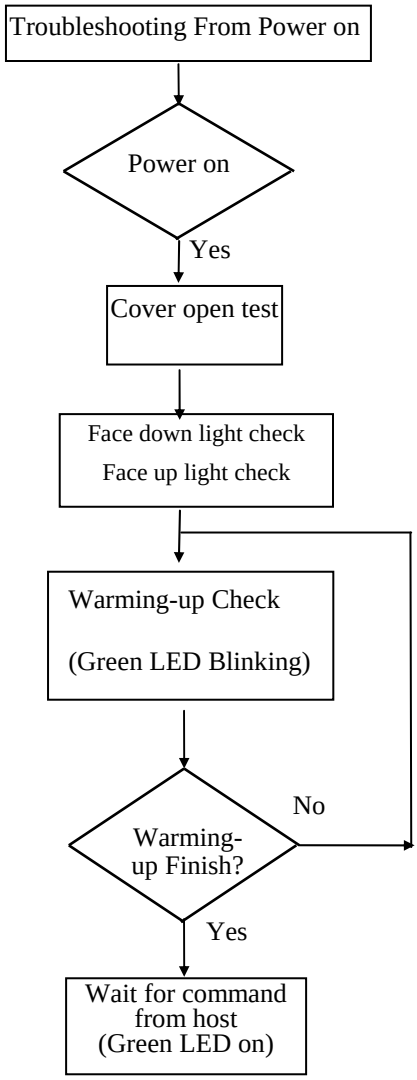
Refer first to the applicable troubleshooting flowchart in the following three sections. The flowcharts refer you to the appropriate table for detailed troubleshooting.

5.2.1 Flowcharts

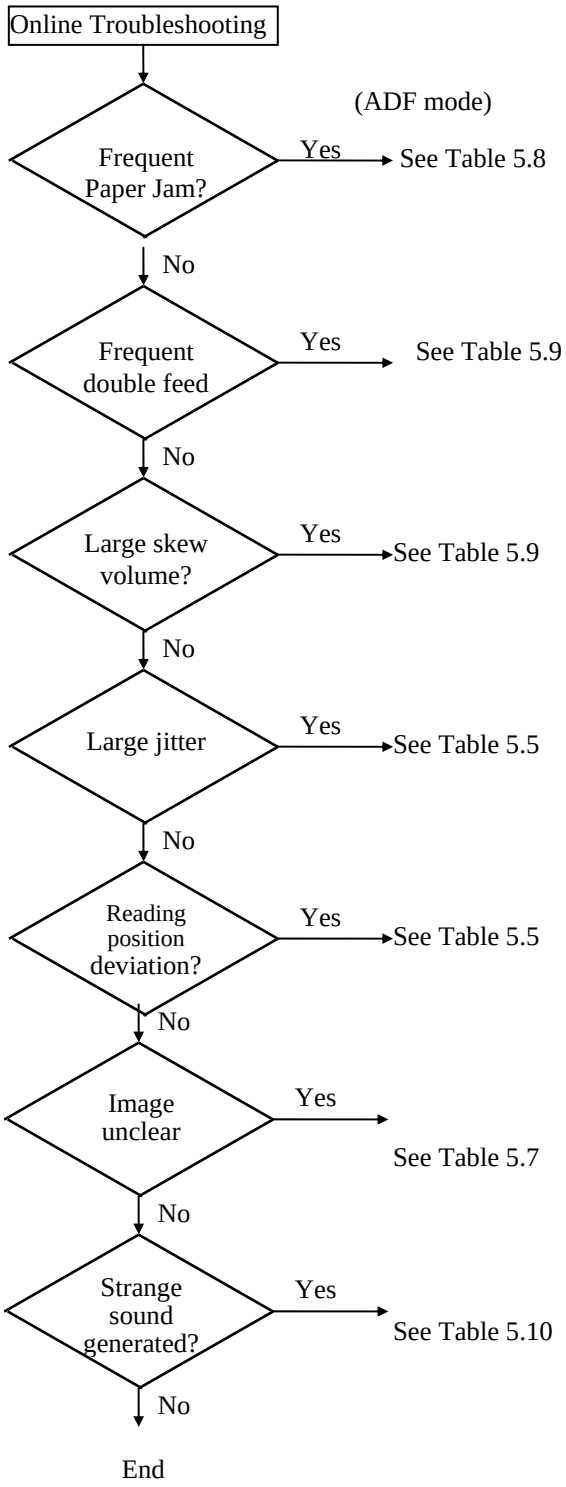
This section provides the following troubleshooting flowcharts:

- Troubleshooting from power on to scanner ready
- Online troubleshooting (ADF operation)

5.2.1.1 Troubleshooting flowchart: power on to scanner ready.



5.2.1.2 Troubleshooting flowchart: online ADF operation



5.2.2 Tables

The tables in this section provide detailed troubleshooting information.

5.2.2.1 Reading is not performed

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
ADF cover open	ADF cover	Visual check	Close the ADF cover.	None

Table 5.3

5.2.2.2 Image does not appear

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
ADF cover open	ADF cover	Visual check	Close the ADF cover	None
Power supply-main control board connection failure	None	Visual check	Connect the connector.	None
Power supply fails.	Power supply	Tester check (+24V, GND)	Replace the power supply.	None
Lamp failure	Lamp	Visual check	Replace the lamp.	None
Inverter failure	Inverter	Visual check	Replace the inverter.	None
CCD board-main control board connection failure	None	Visual check	Connect the connector.	None
CCD board fails.	CCD Board	Visual check	Replace the optical unit.	None

Table 5.4

5.2.2.3 Large jitter

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Power supply-main control board connection failure	None	Visual check	Connect the connector.	None
Power supply fails	Power supply	Tester check (+24V, GND)	Replace the power supply.	None
Motor-main control PCBA connection failure	None	Visual check	Connect the connector.	None
Motor failure	Motor	Visual check	Replace the motor.	None

Table 5.5

5.2.2.4 Reading position deviation

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Power supply-main control board connection failure	None	Visual check	Connect the connector.	None
Power supply fails	Power supply	Tester check (+24V, GND)	Replace the power supply.	None
Motor- main control PCBA connection failure	None	Visual check	Connect the connector.	None
Motor failure	Motor	Visual check	Replace the motor	None

Table 5.6

5.2.2.5 Image unclear

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Lamp too dark	Lamp	Visual check	Replace with a new lamp.	None
Dirt on calibration reference plate	Calibration reference plate	Visual check	Clean the glass with isopropyl alcohol.	None
Dirt on calibration reference plate	Calibration reference plate	Visual check	Clean the calibration reference plate with isopropyl alcohol.	None
Dirt on the mirrors	Mirrors	Visual check	Clean the mirrors with isopropyl alcohol.	None
Dirt on the lens	Lens	Visual check	Clean the lens with isopropyl alcohol.	None

Table 5.7

5.2.2.6 Frequent paper jam

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Paper setting failure	Operation error	Is the paper correctly set in the paper chute?	Teach users to properly position the paper.	None
Paper failure	operation error	Is the specified paper used?	None	None
Pad assembly failure	Pad assembly	Check the pad assembly for wear and tear	Replace the pad assembly/ touch spring unit.	None

Table 5.8

5.2.2.7 Frequent double feed and skew

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Paper setting failure	Operation error	Is the paper correctly set in the paper chute?	Teach users to properly position the paper	None
Paper failure	Operation error	Is the specified paper used	None	None
Pad assembly failure	Pad assembly	Check the pad assembly for wear and tear.	Replace the pad assembly/ touch spring unit.	None

Table 5.9

5.2.2.8 Strange sound generated (ADF)

Cause	Relevant Unit	Check Method	Maintenance Method	Remark
Paper setting failure	Operation error	Is the paper correctly set in the paper chute?	Teach users to properly position the paper	None
paper failure	Operation error	Is the specified paper used?	None	None

Table 5.10

6. DISASSEMBLY

6.1 Service Tool

Table 6.1 describes the maintenance tools necessary for the maintenance of this equipment.

No.	Name	Description
1	Minus screwdriver	Idler pulley module screw
2	Philips screwdriver (magnetic)	Nominal No.2 M3, M4
3	Alcohol (Isopropyl 91% >)	Cleaning
4	Digital voltmeter	With 0.01 V range
5	Oscilloscope	100 MHz or more with external sweep

Table 6.1 Maintainence tools

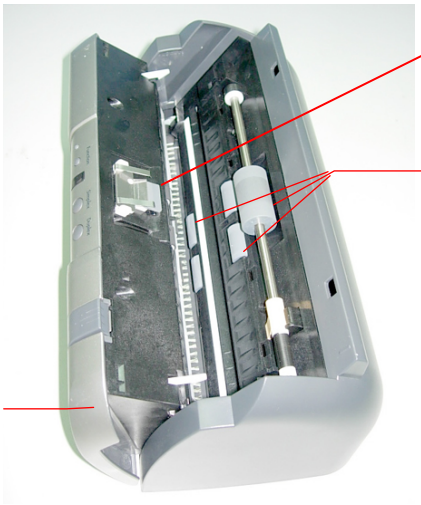
6.2 Cleaning the ADF

From time to time the ADF pad and feeding rollers may become contaminated with ink, toner particles or paper dust. In this case the scanner may not feed documents smoothly. If this occurs please follow the cleaning procedures to return your machine to its original state.

The Cleaning Procedures

1. Soak a cotton swab with some isopropyl alcohol. (95%).
2. Press the ADF release button. Open the front door to the left. Wipe the upper feeding roller by moving the swab from side to side. Rotate the roller forward with your finger and repeat the cleaning steps above until the entire roller is cleaned.
3. Wipe the end of the pad. Be careful not to damage the pick springs.
4. Close the scanner front door. Your scanner is now ready for use.

ADF Release Button



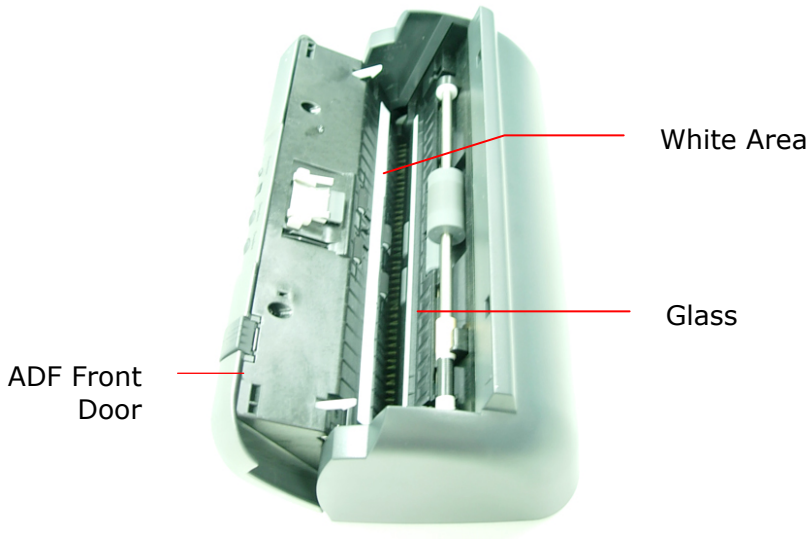
ADF Pad

Feeding Roller

Front Door

6.3 Cleaning the Glass

1. Press the ADF Release button. Open the front door to the left.
2. Wet a cotton swab with some isopropyl alcohol. (95%)
3. Wipe the glass and the white area as illustrated in below by moving the swab from side to side to rid the dust or dirt.



6.4 Procedure for disassembly and reassembly

6.4.1 Notes on disassembly

(1) Clean the disassembly and assembly location.

(2) Disconnect the power cable and remove the AC plug from the outlet before disassembly and assembly.

(3) Follow the disassembly and assembly procedures. Never loosen the screws of parts that must not be disassembled.

(4) Store the disassembled parts in a clean place to avoid loss.

(5) After replacement, check the contacts and spare part mounting.

(6) Assemble the parts in reverse order of disassembly procedure.

6.4.2 Removing the Input Tray

1. Move forward the ADF release button.
2. Open the Front Door to the left.
3. Hold two sides of the Input Tray as indicated to remove it.

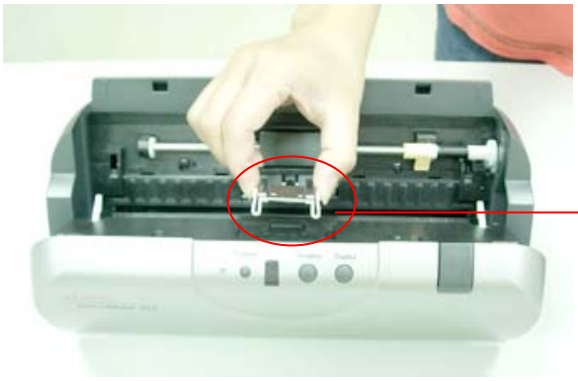
ADF Release Button

Input Tray

Front Door

6.4.3 Removing the ADF Snap-in Pad

1. Move forward the ADF release button.
2. Open the Front Door to the left.
3. Use your fingers to hold two sides of the ADF Snap-in Pad to remove it.

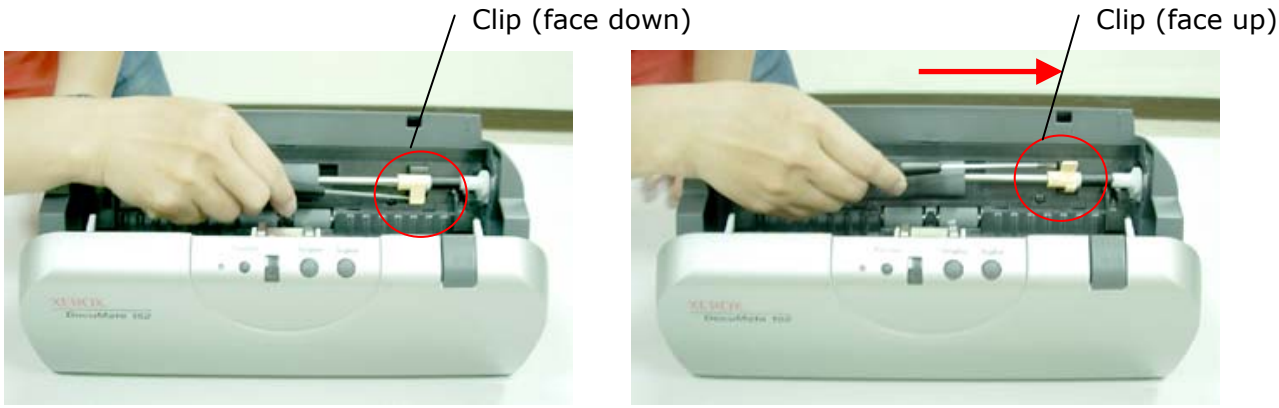


6.4.4 Removing the ADF Roller

1. Move forward the ADF release button and open the Front Door to the left as described in section 6.4.4.

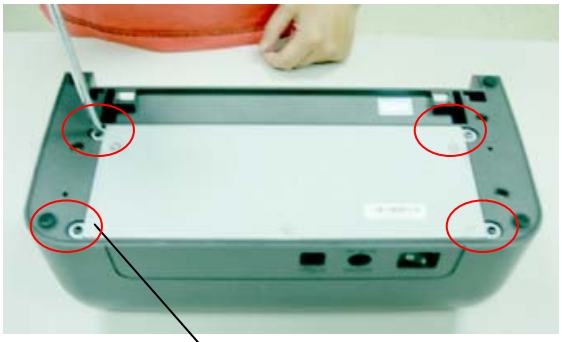
2. Move the yellow clip of the ADF roller face up with a flat screw driver as indicated.

3. Hold and press the roller in the arrow direction as indicated to remove the roller.



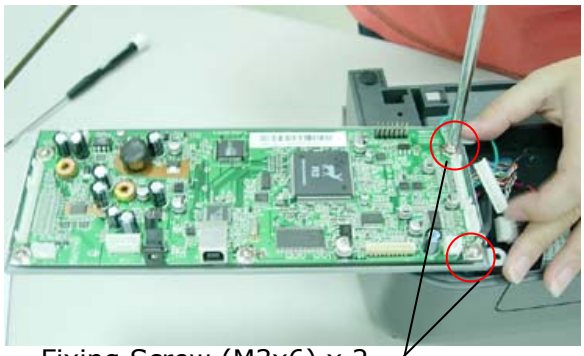
6.4.5 Removing the Main Board

1. Remove the Input Tray as described in preceding section (sec. 6.4.2).
2. Turn over the scanner. Remove four fixing screws of the main board.
3. Raise the main board cover and disconnect all cables. The main board is removed.



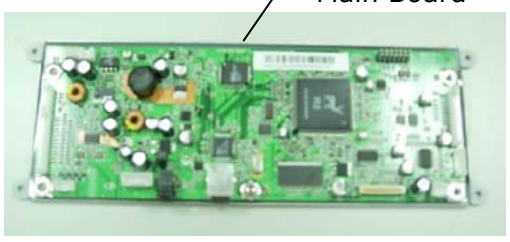
Fixing Screws (M3x6) x 4

Main Board



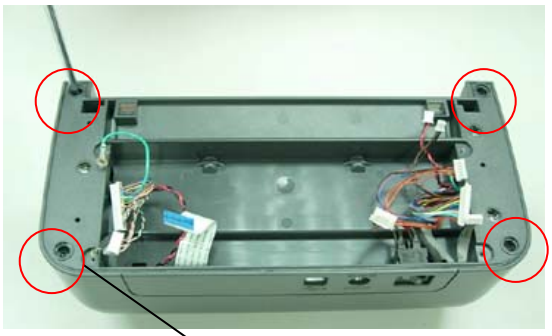
Fixing Screw (M3x6) x 2

Main Board



6.4.6 Removing the Upper Housing

1. Remove the Input Tray as described in preceding sec. 6.4.2.
2. Remove the Main Board as described in preceding section 6.4.5.
3. Turn over the scanner as illustrated. Remove four rubber stands on the corners and then remove the fixing screws.
4. Turn over the scanner to its normal position and hold the power switch to gently remove the Upper Housing as indicated and then lift it up.



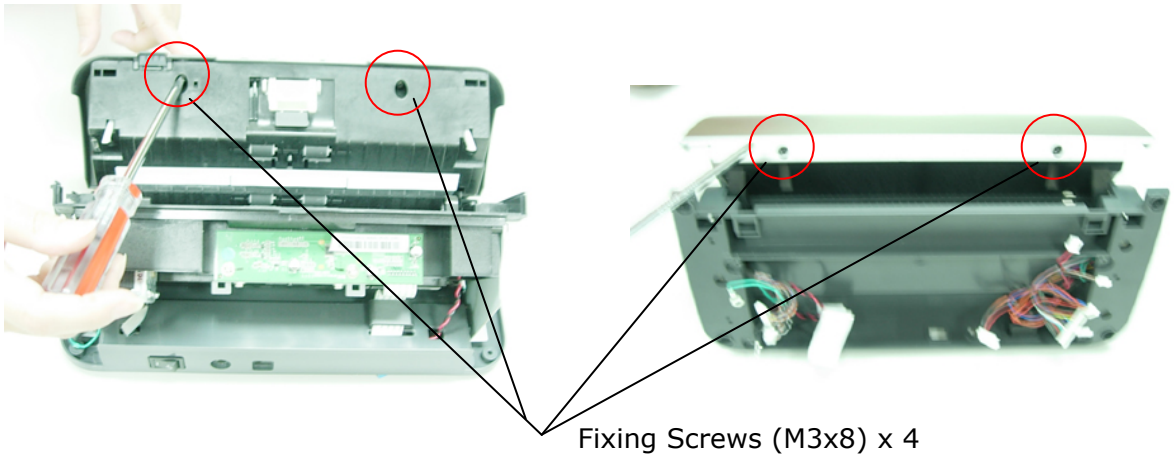
Fixing Screws (M3x8) x 4

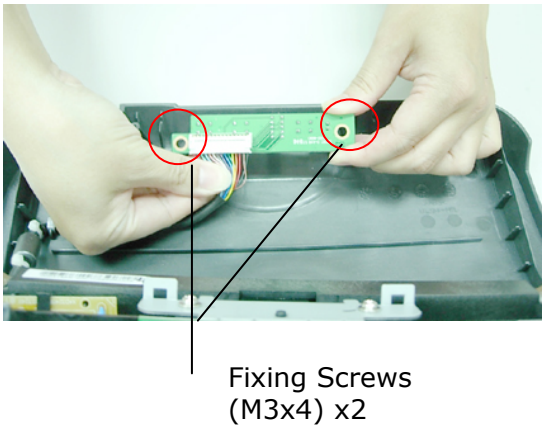
Upper Housing

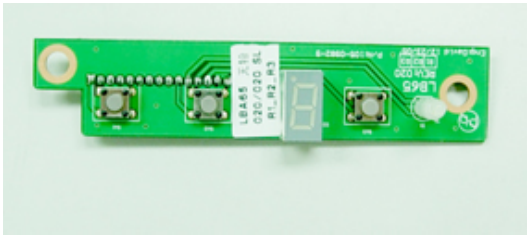
Upper Housing

6.4.7 Removing the Button Panel PCBA

1. Remove fixing screws of the ADF unit.
2. Turn the scanner over to remove the fixing screw (M3x8) of the front cover.
3. Open the Front Cover to reveal its bottom.
4. Disconnect the Panel PCBA cable and the fixing screws (M3x4) as illustrated.
5. Remove the Button Panel PCBA.



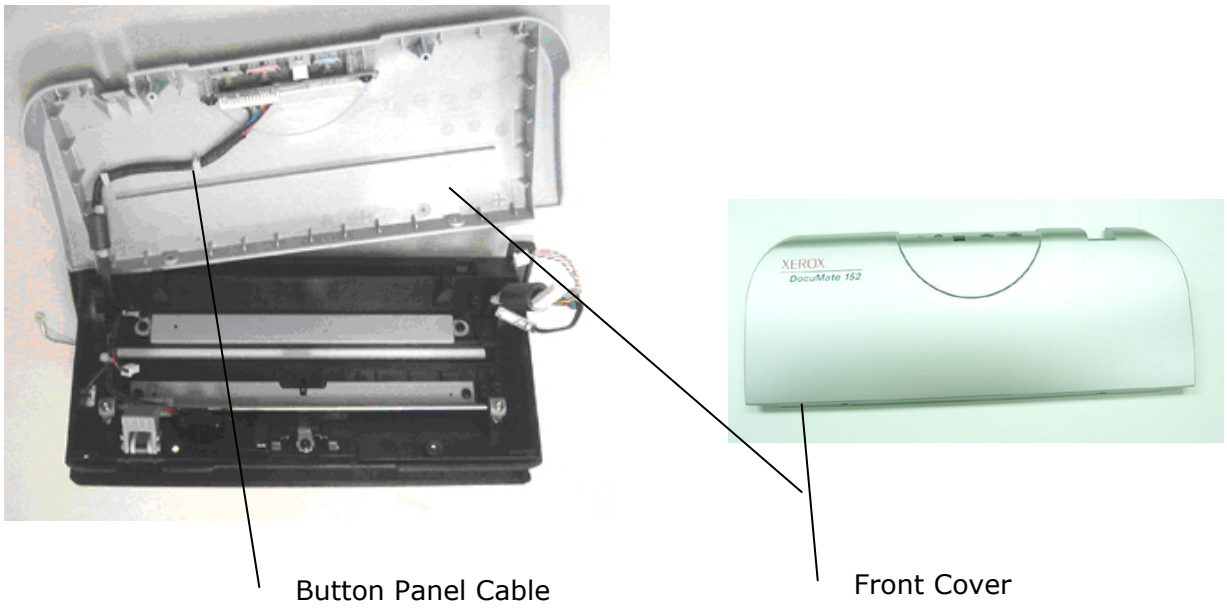




Button Panel PCBA

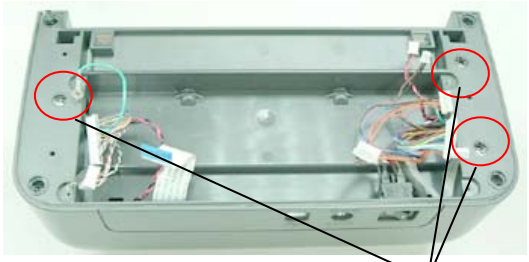
6.4.8 Removing the Front Cover

1. Remove Button Panel PCBA as described in 6.4.7.
2. Remove the Button Panel cable from the Front Cover.
3. Remove the Front Cover.

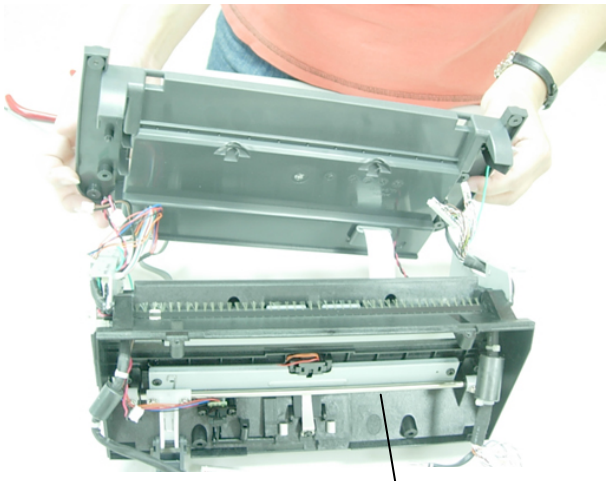


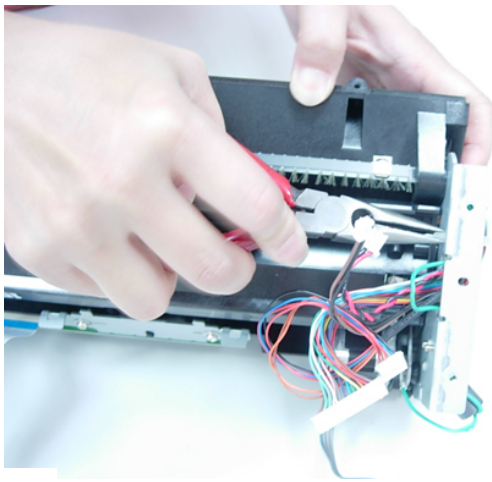
6.4.9 Removing Paper Guide (Lower)

1. Turn over the scanner.
2. Remove three fixing screws as illustrated.
3. Open the bottom cover and remove the lower chassis assembly as illustrated.
4. Disconnect all cables pull the cables out of the metal board.
5. Remove four fixing screws of the lower chassis.
6. Remove the Lower Paper Guide.

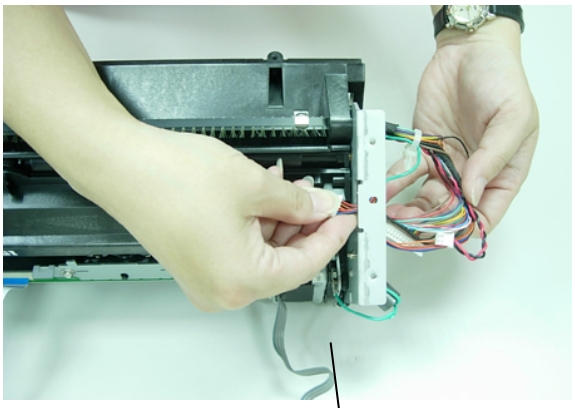


Fixing Screws

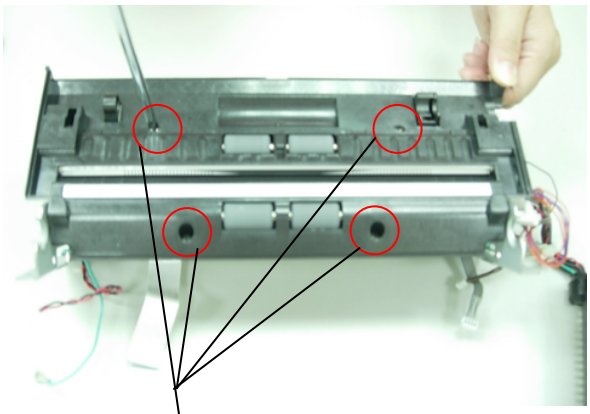




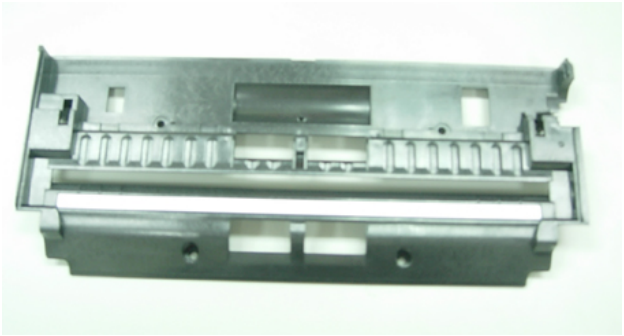
Lower Chassis Assy



Pull the cables out of the metal board.



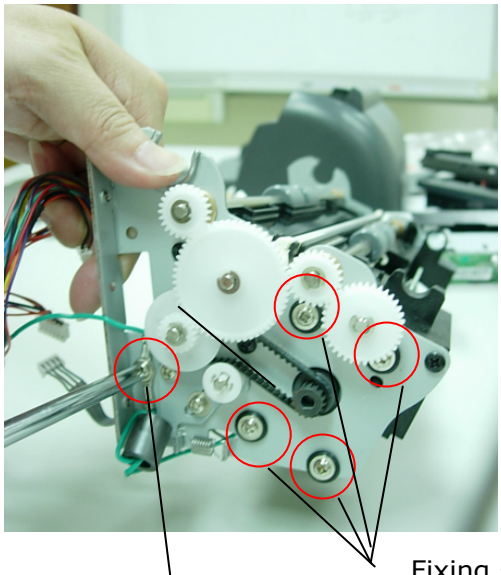
Fixing Screws (M3x6) x 4

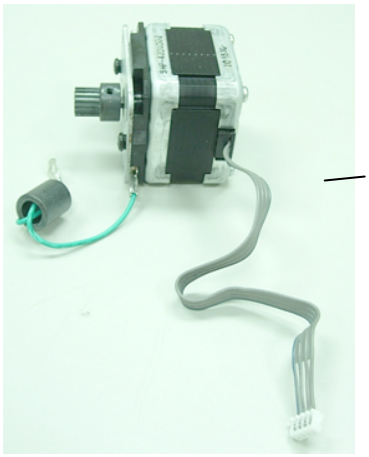


Paper Guide, Lower

6.4.10 Removing the Motor (Lower)

1. Remove the Lower Chassis as described in sec. 6.3.11.
2. Remove the fixing screw for ground wire as illustrated.
3. Remove four the fixing screws of the motor.

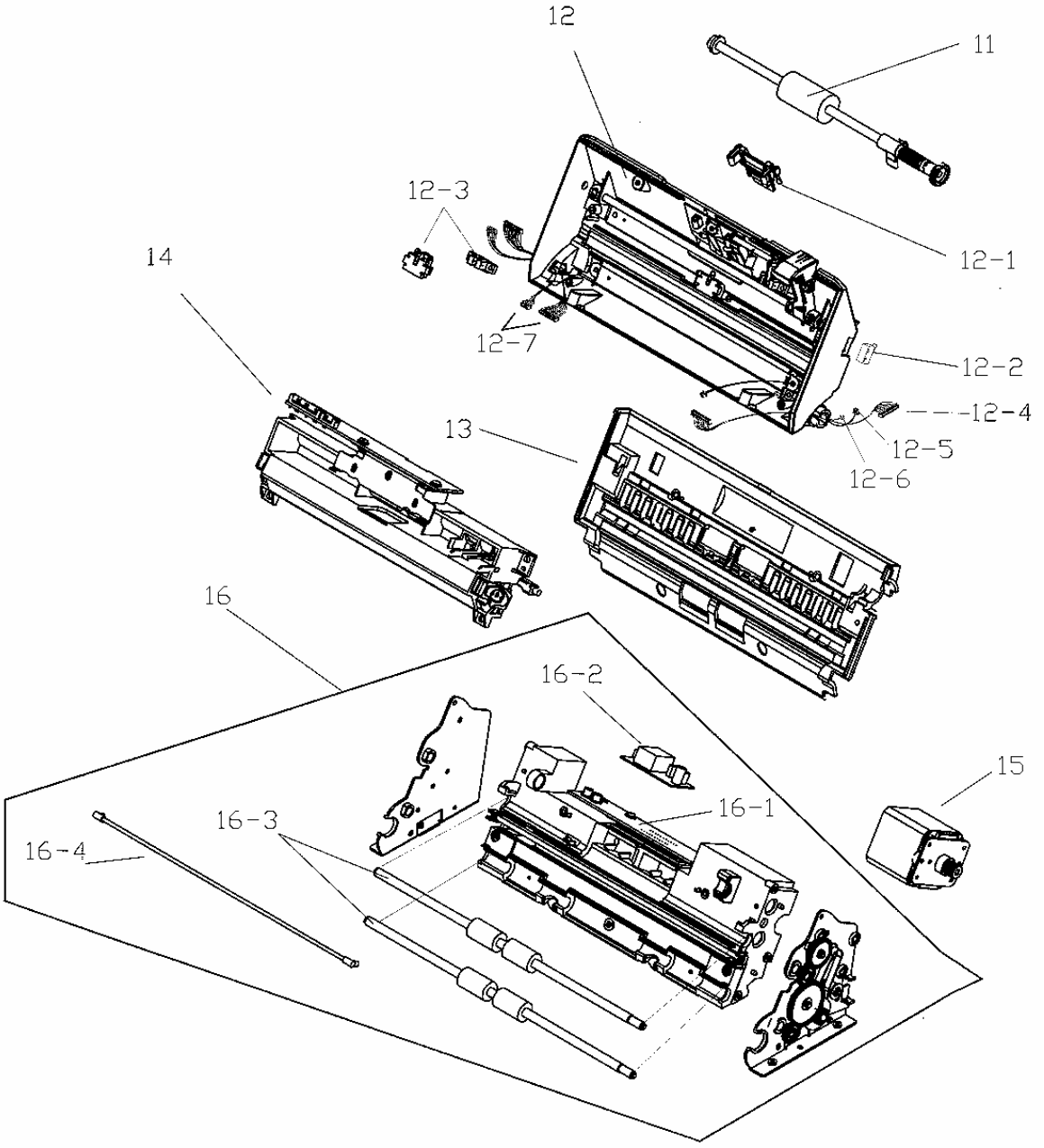


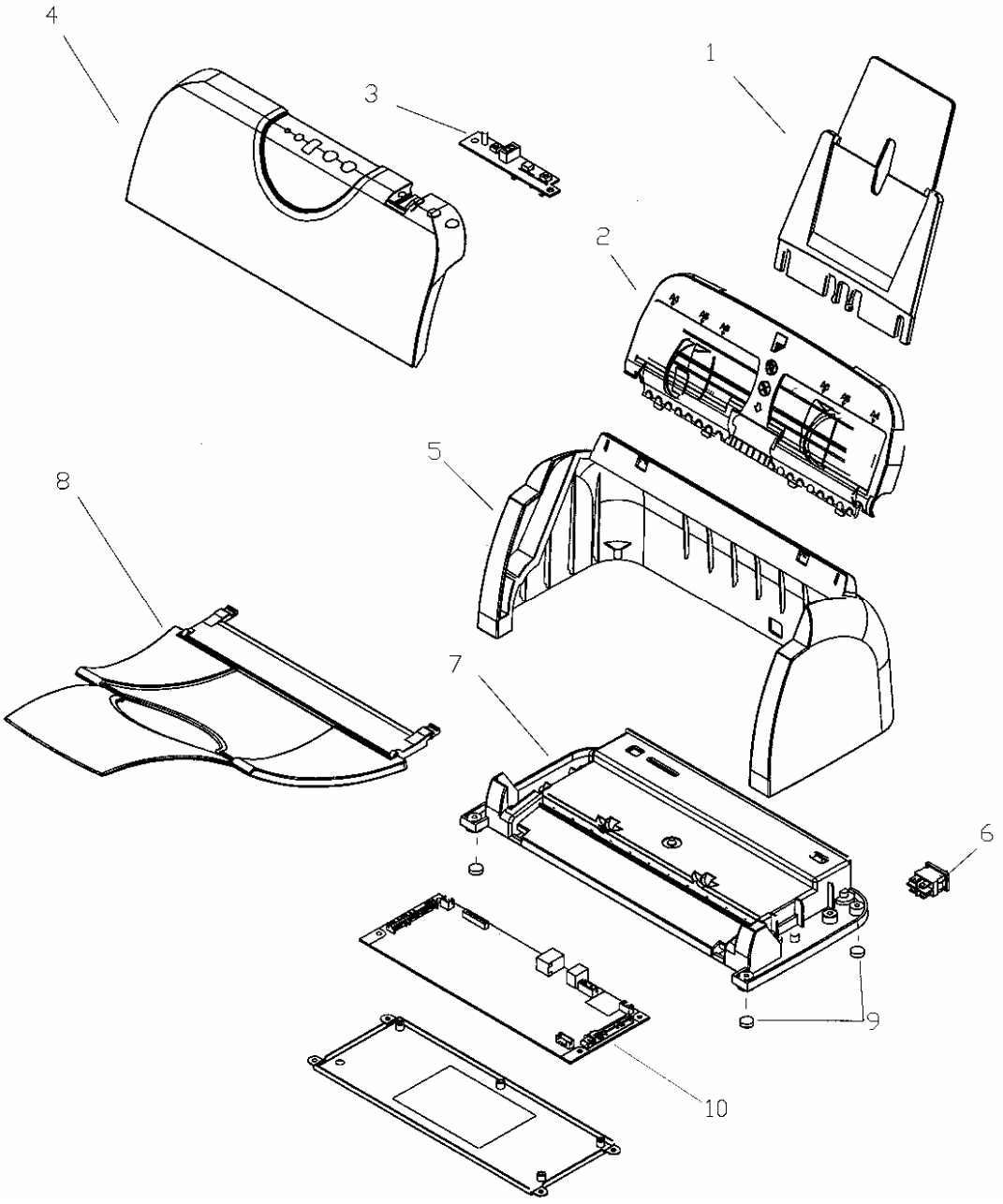


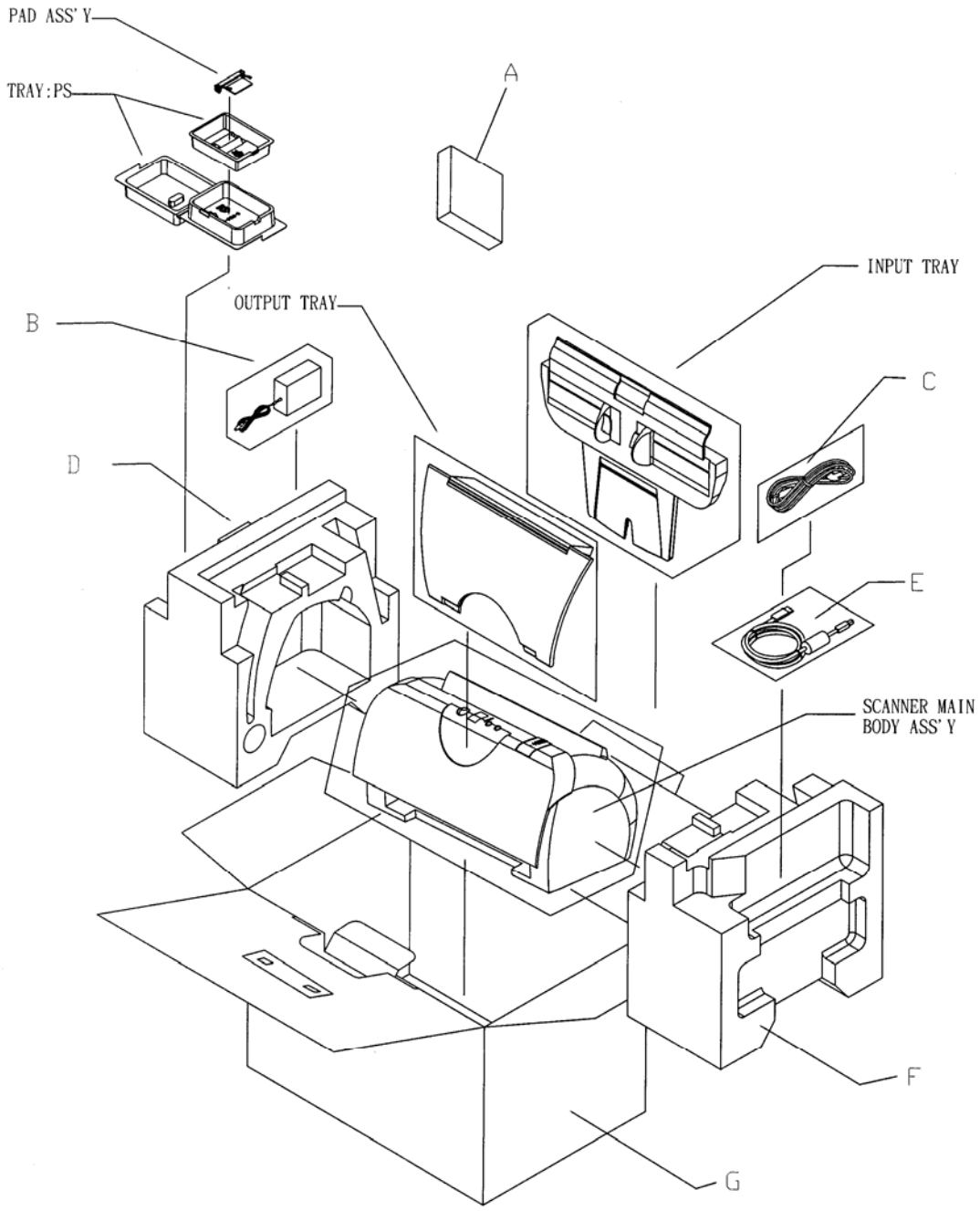
7. PARTS

7.1 Spare Part Diagram / Table

7.1 Spare part diagram







ITEM	P/N	DESCRIPTION	REV.	ORDER QUANTITY
1	002-2808C-0-SP	S-PARTS:ASS'Y,EXTEND,RoHS	100	1
1-1	003-6423-0-SP	S-PARTS:ASS'Y,INPUT TRAY,RoHS	100	1
2	004-1574-9-SP	S-PARTS:PCBA:LBA65,RoHS	100	1
3	002-4176A-0-SP	S-PARTS:ASS'Y,FRONT COVER, "SCAN,CANCEL,FUNCTION",RoHS	100	1
4	051-2678B-0-SP	S-PARTS:HOUSING,UPPER,ABS,2.5t,306x144x136.5, RoHS	100	1
5	008-0144D-09-SP	S-PARTS:ASS'Y, POWER S/W,DWA-003, 5P,P=2.5mm,L=50mm,W/TUBE,RoHS	100	1
6	051-2679B-0-SP	S-PARTS: HOUSING,BOTTOM,ABS,2.5t,300x137.5x53 ,RoHS	100	1
7	002-2806B-0-SP	S-PARTS:ASS'Y, OUTPUT TRAY,RoHS	100	1
8	057-0295C-0-SP	S-PARTS:RUBBER STAND:SILICON,60,10.7x5.5t,RoHS	100	1
9	003-6426-0-SP	S-PARTS:PCBA,MBA367,W/FW(259-0206-1),RoHS	100	1
10	002-2642C-0-SP	S-PARTS:ASS'Y, ADF ROLLER,RoHS	100	1
11	002-2648C-0-SP	S-PARTS:ASS'Y,PAD,RoHS	100	1
12	002-4177-0-SP	S-PARTS:ASS'Y,PAPER GUIDE,UPPER,,RoHS	100	1
12-1	008-0118C-09-SP	S-PARTS:ASS'Y,SWITCH, SWITCH+2P HOUSING,DW-2P235,WIRE:L=235mm,RoHS	100	1
12-2	008-0018C-09-SP	S-PARTS:ASS'Y SENSOR,L/P SENSOR+PHOTO SENSOR /6P, L=430/345mm,FI-23FF-AV21,RoHS	100	1

12-3	104-0570A-19-SP	S-PARTS: CABLE: 15P,L=360mm,28AWG,DW201536,W/TUBE,W/CORE,RoHS	200	1
12-4	104-0400A-19-SP	S-PARTS: CABLE, GROUNDING,L=120mm,22AWG,CS-050334,	400	1
13	002-3152C-0-SP	S-PARTS:ASS'Y, PAPER GUIDE LOWER,W/GLASS,RoHS	100	1
14	003-6424-0-SP	S-PARTS:ASS'Y,OPTICAL,FACE DOWN,W/PLATE&DAMPER,RoHS	100	1
14-1	003-6425-0-SP	S-PARTS:ASS'Y,OPTICAL,FACE DOWN,W/O INVERTER,RoHS	100	1
14-2	005-0012C-09-SP	S-PARTS: INVERTER: 24V,6mA,35KHz,XAD324SR,TDK,RoHS	100	1
14-3	057-0293C-0-SP	S-PARTS:ROLLER, FEED:φ14.6,EPDM,266.1,RoHS	100	1
14-4	067-0062C-49-SP	S-PARTS: CCFL, φ2.6x250x1, X=0.329(SR-3),Y=0.342(SR-3),FCF-I026002505-01, RoHS	100	1
14-5	104-0620C-19-SP	S-PARTS: CABLE,INVERTER:2P,L=200mm,24AWG, DW-C1101,RoHS	300	1
ACCESSARY				
A	005-3025B-09-SP	S-PARTS:ADAPTER:DESK-TOP,IEC 320-C6,3P,100~240Vac,24Vdc,2A,48W,HEG42-240200-7L(A) LF,HITRON,CLASS I,ENER,RoHS	100	1
B-1	104-8006C-09-SP	S-PARTS:AC POWER CORD, EUR.(CEE),2P+G. BASE, 16A/250V,L=1800mm,3C*0.75mm2,BLACK,PG8B9CIJG0A-05B,RoHS	300	1
B-2	104-8007D-09-SP	S-PARTS:AC POWER CORD: US,3P,10A/125V,L=1800mm,3C*18AWG,BLACK, PH8B2EDJF0A-05B,RoHS	400	1
B-3	104-8011B-09-SP	S-PARTS: POWER CORD:UK(BS/PSB),3P,3A/250V,L=1800mm,3C*0.75mm2,BLACK,PG8B9X3JG0A-05B,RoHS	100	1
E	104-6053A-09-SP	S-PARTS:USB2.0 CABLE, L=1850mm,C041-370448-A,28AWG,W/CORE,PANTONE 432C(BLACK),RoHS	100	1

F	072-0528-0	FOAM, EPS,L:240x225x130mm, 62.5,RoHS	100	1
G	072-0529-0	FOAM, EPS,R:240x225x130mm, 62.5,RoHS	100	1
H	073-1598-0	CARTON:405x252x255,A/F,RoHS	200	1

Spare Parts Table